

UC-NRLF



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Kentucky Geological Survey,

Bulletin No. 21

Serial No. 28

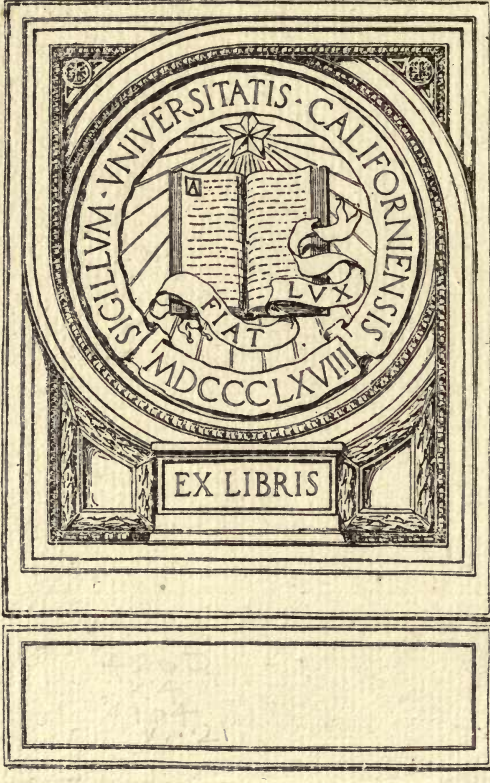
THE VALUE OF THE DIX RIVER
AS A
SOURCE OF WATER POWER

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KENTUCKY GEOLOGICAL SURVEY

CHARLES J. NORWOOD, Director

Supplementary Report on Dix River

BY

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The proposed site of the water power dam on the Dix River is located a little more than a mile south of the Kentucky River, the stream into which the Dix River empties.

This site offers ideal conditions for the erection of a high dam. The gorge of the Dix River here is comparatively narrow and the rocky walls on both sides are practically continuous from top to bottom and very steep. The sides of the dam may be ledged in gashes cut into the rock walls of the gorge in such a manner that no waterpressure will ever be able to dislodge a properly constructed dam. Moreover, the underlying rock is sufficiently thick to support any weight of rock without giving way. These facts are brought out by the following data.

At High Bridge, directly opposite the mouth of the Dix River, the top of the very fine limestone forming the walls of the Dix River gorge, is found at 795 feet above sea level. The water level at the proposed dam site is approximately 500 feet above sea level, so that the fine grained rock will not only form the lateral support of the entire height of the dam, but will rise above the extreme top of the dam for a considerable distance.

This fine grained rock is extremely hard and will withstand an enormous pressure. It is the hardest rock known in the State of Kentucky.

It is almost continuous from top to bottom, forming massive vertical walls which are interrupted at intervals of twenty to thirty feet by thin, shaly limestone layers, usually only a few inches in thickness, and rarely exceeding two feet, so that from an engineering standpoint the rock walls confining the gorge may be considered as practically continuous from top to bottom. In all of the quarries opened in this rock, the softer layers become hard when the quarrying operations are carried back from the exposed, weathered surfaces, and the same result may be obtained by a little quarrying at the bottom of the dam site, such operations as undoubtedly will be found necessary in providing for the lateral supports of the dam.

This very fine grained rock is of a very low degree of porosity. It will absorb very little water and will admit of only a very slow rate of seepage. It therefore will not carry away any appreciable part of the water caught in the reservoir behind the dam, during the late summer months when the rainfall is least. Moreover, a rock of such little porosity will not be readily soluble.

The total thickness of this very fine grained rock within the limits of the State of Kentucky, and especially at High Bridge, has not been determined. It is sufficient to state that at Camp Nelson about six miles east of the dam site, Prof. Arthur M. Miller found a vertical section of 400 feet of this rock actually exposed, and with the base of the very fine grained limestone evidently at a still lower level. In this case it is at least certain that 200 feet of very fine grained, hard limestone underlie the water level at the proposed dam site, and for all practical purpose, this thickness is already so far in excess of actual necessities for the support of the base of a high dam, that I venture the opinion that nowhere in the State of Kentucky is there to be found any site equally favorable to the erection of a high dam, well anchored, and with smaller opportunities for seepage, firmly supported at the base, and within such short distances from towns of considerable present and future importance.

This fine grained limestone was mapped by the United States Geological Survey under the name of the High Bridge limestone. It underlies a considerable thickness of coarse grained limestone, known as the Lexington limestone. This Lexington limestone corresponds to the Trenton limestone of other States, and most of the High Bridge limestone corresponds to the Chazy limestone of other States, although the top of the High Bridge limestone is correlated with the Lowville limestone of New York. These statements are

sufficient to indicate that the walls of the gorge in the lower part of the Dix River channel are composed of the High Bridge limestone, although the lower part of the Lexington limestone is exposed along the hill tops beyond the walls of the gorge.

If the dam does not exceed 160 feet in height, no part of the reservoir will rise above the top of this fine grained High Bridge limestone, even when backing up as far as the old mill near the Marcellus crossing.

I made a very careful examination of the rocky walls of the gorge the entire length of the proposed reservoir, which will back up behind the dam, and found no reason to believe that any underground channels would drain off the water. The rocky walls are well exposed on both sides of the river for this entire length, and there are no points where the water drops to a lower level. This statement takes into account the considerable seepage through the narrow neck known as the Frying Pan Bend, below Davistown, which is a case of horizontal seepage at a point where the river returns almost to its original position after a long detour.

During my trip down the river, I found frequent evidence of the presence of solid rock only a short distance below water level. Owing to the rapidity of the flow of the river during freshest, the bottom of the channel is swept almost clean of gravel deposits at many points, and the depth of the gravel at no point exceeds a few feet. No gravel deposit exceeding ten feet in thickness is known at any point along the lower part of the river.

From these data it may fairly be assumed that the gravel deposits at the head of the back water, where it is proposed to erect the new dam, will be found equally shallow, especially in view of the fact that this back water did not exist formerly, but has resulted from the erection of a dam in the Kentucky River, which will not interfere in any way with the proposed Dix River dam.

As far as the erection of a second dam somewhere near Marcellus is concerned, it is sufficient to state that the confining walls in this upper part of the Dix River, as far back as the present reservoir used by the Danville water works, consist of the same very fine grained limestone, belonging to the High Bridge series, already described on the preceding pages.

Signed,

Approved; AUG. F. FOERSTE, Assistant Geologist,
C. J. NORWOOD, Director Kentucky Geological Survey.
Kentucky Geological Survey

January, 1912.

